IT IS CLAIMED:

Sub B1 C2

1. A method for detecting or quantitating an analyte present in a liquid sample, comprising,

reacting the liquid sample with an analyte-reaction reagent,

by said reacting, generating a solution form of a first coil-forming peptide having a selected charge and being capable of interacting with a second, oppositely charged coil-forming peptide to form a stable α-helical coiled-coil heterodimer,

contacting the first coil-form peptide generated by said reaction with a biosensor having a detection surface with surface-bound molecules of such second, oppositely charged coil-forming peptide, under conditions effective to form a stable α-helical coiled-coil heterodimer on said detection surface, where the binding of the solution form of the coil-forming peptide to the immobilized coil-forming peptide is effective to measurably alter a signal generated by the biosensor, and

measuring the signal generated by the biosensor, to determine whether such coiled-coil heterodimer formation on said detector surface has occurred.

2. The method of claim 1, wherein said analyte is a ligand, and said reacting includes mixing the analyte with a conjugate of the first coil-forming peptide and the analyte or an analyte analog, and reacting the analyte and conjugate with an analyte-binding anti-ligand agent, such that the amount of unbound conjugate generated is inversely proportional to the amount of analyte.

3. The method of claim 2, wherein the analyte-bound agent is immobilized.

Sub B2

4. The method of claim 1, wherein said analyte is a ligand, and said reacting includes mixing the analyte with a conjugate of the first coil-forming peptide and the analyte or an analyte analog, under conditions that the conjugate is displaced from an immobilized analyte-binding anti-ligand agent by the presence of analyte.

5. The method of claim 1, wherein the said analyte is an enzyme and said reacting is effective to enzymatically release said second coil-forming peptide in soluble form in the presence of analyte.

6. The method of claim 1, wherein the biosensor is an electrochemical biosensor that includes a conductive detection surface, a monolayer composed of hydrocarbon chains anchored at their proximal ends to the detection surface, and the second charged coil-forming peptide also

anchored to said surface, where the binding of the first peptide to the second peptide, to form such heterodimer, is effective to measurably alter current flow across the monolayer mediated by a redox ion species in an aqueous solution in contact with the monolayer, relative to electron flow observed in the presence of the second peptide alone.

7. The method of claim 5, wherein the redox ion species has the same charge as said second coil-forming peptide, and the binding of the first peptide to the second peptide is effective to enhance ion-mediated current flow across said monolayer.

8. The method of claim 6, wherein the redox ion species is $Fe(CN)_6^{3-}$, if the charge of said first coil-forming peptide is negative, and $Ru(NH_3)_6^{3+}$, if the charge of said first coil-forming peptide is positive.

Sub B3

9. The method of claim 5, wherein the redox ion species has a charge opposite that of said second coil-forming peptide, and the binding of the first peptide to the second peptide is effective to reduce ion-mediated current flow across said monolayer.

10. The method of claim 8, wherein the redox ion species is $Fe(CN)_6^{3-}$, if the charge of said first coil-forming peptide is positive, and $Ru(NH_3)_6^{3+}$, if the charge of said first coil-forming peptide is negative.

11. A diagnostic device for use in detecting or quantitating an analyte present in a liquid sample, comprising,

a reaction reagent effective to react with analyte to generate a solution form of a first coil-forming peptide having a selected charge and being capable of interacting with a second, oppositely charged coil-forming peptide to form a stable α-helical coiled-coil heterodimer,

a biosensor having a detection surface with surface-bound molecules of a second charged, coil-forming peptide capable of interacting with the first oppositely charged coil-forming peptide to form a stable α-helical coiled-coil heterodimer, where the binding of the first peptide to the second peptide, to form such heterodimer, is effective to measurably alter a signal generated by the biosensor, and

a detector for measuring the change in a signal generated by the biosensor, in response to conjugate binding to the first charged, coil-forming peptide.

12. The device of claim 11, which further includes a substrate having formed therein (i) a sample-introduction region, (ii) said biosensor, and (iii) a sample-flow pathway between said

sample-introduction region and said biosensor, and said reaction reagent is disposed in said sample-flow pathway and includes a conjugate of the first coil-forming peptide and the analyte or an analyte analog, in a form releasable into the sample liquid, and an analyte-binding agent.

13. The device of claim 11, wherein the sample-flow pathway includes a mixing zone containing the conjugate in releasable form, and a reaction zone containing the analyte-binding agent in immobilized form.

14. The device of claim 11, which further includes a background control biosensor and a control sample-flow pathway connecting the sample-introduction region to the background control biosensor, and said control sample-flow pathway does not include said conjugate.

15. The device of claim 11, for use in detecting or quantitating a plurality of different selected analytes, which further includes, for each analyte, (i) a separate biosensor, and (ii) a separate sample-flow pathway connecting the sample-introduction region to each associated biosensor, where each sample-flow pathway includes (i) a conjugate of the second coil-forming peptide and one of the selected analytes or analog thereof, and (ii) an associated selected analyte-binding agent.

16. The device of claim 14, wherein each biosensor contains substantially the same first charged, coil-forming peptide.

17. The device of claim 14, wherein said sample-introduction region is a single port communicating with each of the sample-flow pathways.

18. The device of claim 11, wherein the first coil-forming peptide is a positively or negatively charged leucine-zipper peptide, and the second coil-forming peptide is a leucine-zipper peptide of the opposite charge.

19. The device of claim 11, for use in detecting the presence or amount in a sample of an analyte which forms with said analyte-binding agent, an analyte-analyte binding agent pair selected from the group consisting of antigen-antibody, hormone-receptor, drug-receptor, cell-surface antigen-lectin, biotin-avidin, and complementary nucleic acid strands.

20. The device of claim 11, wherein the biosensor is an electrochemical biosensor that includes a conductive detection surface, a monolayer composed of hydrocarbon chains anchored

at their proximal ends to the detection surface, and the second charged coil-forming peptide also anchored to said surface, where the binding of the first peptide to the second peptide, to form such heterodimer, is effective to measurably alter current flow across the monolayer mediated by a redox ion species in an aqueous solution in contact with the monolayer, relative to electron flow observed in the presence of the first peptide alone.

21. The device of claim 19, wherein the redox ion species has the same charge as said first coil-forming peptide, and the binding of the second peptide to the first peptide is effective to enhance ion-mediated current flow across said monolayer.

22. The device of claim 20, wherein the redox ion species is $Fe(CN)_6^{3-}$, if the charge of said first coil-forming peptide is negative, and $Ru(NH_3)_6^{3+}$, if the charge of said first coil-forming peptide is positive.

23. The device of claim 19, wherein the redox ion species has a charge opposite that of said first coil-forming peptide, and the binding of the second peptide to the first peptide is effective to reduce ion-mediated current flow across said monolayer.

24. The device of claim 22, wherein the redox ion species is $Fe(CN)_6^{3-}$, if the charge of said first coil-forming peptide is positive, and $Ru(NH_3)_6^{3+}$, if the charge of said first coil-forming peptide is negative.

25. The device of claim 19, wherein the electrode has a gold detection surface and said monolayer is composed of 8-22 carbon atom chains attached at their proximal ends to the detection surface by a thiol linkage, at a molecular density of about 3 to 5 chains/nm2.

26. The device of claim 11, wherein said biosensor is a gravimetric biosensor that includes a detection surface having the second charged coil-forming peptide anchored thereto, said detection surface is a piezoelectric crystal, and said detector includes means for generating a surface acoustic wave in said crystal and means for detecting the shift in wave frequency, velocity, or resonance frequency of the surface acoustic wave produced by binding of the first to the second coil-forming peptide.

27. The device of claim 11, wherein said biosensor is a surface plasmon resonance biosensor that includes a detection surface having the second charged coil-forming peptide is anchored thereto, said detection surface is a transparent dielectric substrate coated with a thin

metal layer, said substrate and metal layer forming a plasmon resonance interface, and said detector includes means for exciting surface plasmons at a plasmon resonance angle that is dependent on the optical properties of the detector surface, and means for detecting the shift in plasmon resonance angle produced by said binding.

28. The device of claim 11, wherein the biosensor is an optical biosensor that includes a detection surface, a monolayer composed of hydrocarbon chains anchored at their proximal ends to the detection surface, and the second charged coil-forming peptide also anchored to said surface, and said detector includes means for irradiating said surface with a light beam, and means for detecting a change in the optical characteristics of the monolayer produced by said binding.

29. A diagnostic device for use in detecting or quantitating each of a plurality of selected analytes that may be present in a liquid sample, comprising,

a substrate having formed therein a sample-introduction region, and for each selected analyte, an electrochemical biosensor and an associated sample-flow pathway between said sample-introduction region and the associated biosensor,

each biosensor having molecules of a first charged, coil-forming peptide capable of interacting with a second, oppositely charged coil-forming peptide to form a stable α-helical coiled-coil heterodimer, where the binding of the second peptide to the first peptide, to form such heterodimer, is effective to measurably alter a signal generated by the biosensor, and the first and second coil-forming peptides are analyte-independent,

each sample-flow pathway containing (i) a conjugate of the second coil-forming peptide and the associated selected analyte or an analyte analog to be measured, in a form releasable into the sample liquid, and (ii) an analyte-binding agent effective to selectively bind the associated analyte or analyte analog,

wherein sample introduced in said sample-introduction region is adapted to be carried through each sample-flow pathway, where the selected analyte mixes the associated conjugate, and the selected analyte and associated conjugate react with the associated binding agent, under conditions effective to immobilize the selected analyte and conjugate so bound, and

a detector for measuring the change in a signal generated by each biosensor, in response to conjugate binding to the first charged, coil-forming peptide in each biosensor.

30. The device of claim 29, wherein each biosensor contains substantially the same first charged, coil-forming peptide.

31. The device of claim 29, wherein said sample-introduction region is a single port

communicating with each of the sample-flow pathways.

32. The device of claim 29, wherein the sample-introduction region, biosensor, and sample-flow pathway are microfabricated on the substrate.

33. The device of claim 29, wherein each sample-flow pathway includes a mixing zone containing the selected conjugate in releasable form, and an associated reaction zone containing the selected analyte-binding agent in immobilized form.

34. The device of claim 29, wherein each biosensor includes a conductive detection surface, a monolayer composed of hydrocarbon chains anchored at their proximal ends to the detection surface, and the first charged coil-forming peptide also anchored to said surface, where the binding of the second peptide to the first peptide, to form such heterodimer, is effective to measurably alter current flow across the monolayer mediated by a redox ion species in an aqueous solution in contact with the monolayer, relative to electron flow observed in the presence of the first peptide alone.